



# Development and testing of a community audit tool to assess rural built environments: Inventories for Community Health Assessment in Rural Towns

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## ABSTRACT

Rural populations face unique challenges to physical activity that are largely driven by environmental conditions. However, research on rural built environments and physical activity is limited by a paucity of rural-specific environmental assessment tools. The aim of this paper is to describe the development and testing of a rural assessment tool: Inventories for Community Health Assessment in Rural Towns (iCHART). The iCHART tool was developed in 2013 through a multistep process consisting of an extensive literature search to identify existing tools, an expert panel review, and pilot testing in five rural US communities. Tool items represent rural built environment features that influence active living and physical activity: community design, transportation infrastructure, safety, aesthetics, and recreational facilities. To assess reliability, field testing was performed in 26 rural communities across five states between July and November of 2014. Reliability between the research team and community testers was high among all testing communities (average percent agreement = 77%). Agreement was also high for intra-rater reliability (average kappa = 0.72) and inter-rater reliability (average percent agreement = 84%) among community testers. Findings suggest that the iCHART tool provides a reliable assessment of rural built environment features and can be used to inform the development of contextually-appropriate physical activity opportunities in rural communities.

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## 1. Introduction

Rural residents in the United States experience notable disparities in health outcomes as compared to their urban and suburban counterparts (Bolin et al., 2015). These disparities are partly driven by environmental factors such as geographic dispersion, lower socioeconomic status (SES), poorer access to recreation facilities, and greater transportation challenges, which restrict opportunities to be active (Yousefian et al., 2009; Seguin et al., 2014; Kegler et al., 2008; Peterson et al., 2013). Existing studies have emphasized the importance of built environment features (e.g. sidewalks, street connectivity, parks) in shaping physical activity behaviors among urban populations (Yousefian et al., 2010; Feng et al., 2010; Frost et al., 2010); however, evidence from rural contexts remains limited (Frost et al., 2010; Comstock et al., 2016; Hansen et al., 2015).

Previous research suggests that built environment features and environmental correlates of physical activity differ between urban and rural areas, further justifying the need for rural-specific measurement

approaches (Yousefian et al., 2010; Parks et al., 2003; Wilcox et al., 2000). However, existing rural assessment tools have focused solely on individual street segments (Yousefian et al., 2010; Evenson et al., 2009; Fisher et al., 2010; Scanlin et al., 2014) and require multiple, time-intensive assessments to sufficiently capture the dispersed characteristics of rural communities (Robinson et al., 2014).

One challenge to measuring rural built environment features is the lack of a universal definition of ‘rurality’ (Yousefian et al., 2010). For the purposes of the current study, we define rural areas as those with a rural-urban community area code of 4 or higher and a population size <10,000 (Hart et al., 2005), encompassing a range of areas from sparsely populated communities to more compact towns. Given the geographic diversity of these communities, assessment tools should be easily adaptable and able to capture the unique features of rural environments (Yousefian et al., 2010).

Recent recommendations for advancing built environment research have called for simplified assessment methods that are feasible for community leaders and residents to use (Glanz et al., 2015). Built environment assessments can inform community programs and policies by identifying areas for improvement and leveraging existing resources. Engaging community residents in these assessments may be an effective strategy to advocate for these changes; however, few rural tools have been developed for this purpose (Buman et al., 2017). To address

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this need, we aimed to develop and test a simplified rural assessment tool for use by community members and researchers alike: Inventories for Community Health Assessment in Rural Towns (iCHART).

**2. Methods**

**2.1. Development of the iCHART tool**

**2.1.1. Initial iCHART development**

A comprehensive literature review was conducted to identify existing objective audit tools for assessing community physical activity environments. Databases searched included the National Collaborative on Childhood Obesity Research (NCCOR) Measures Registry, Active Living Research Tools and Measures (a program of the Robert Wood Johnson Foundation), and PubMed. A total of 88 tools were identified and evaluated based on their content, context, reliability, and validity. Content encompassed the specific built environment features assessed in each tool, such as street connectivity, proximity to exercise facilities, cycling infrastructure, and aesthetics. Context (metro/urban or small town/rural) was defined according to the location in which each tool was administered during its development. Reliability and validity measures were documented when published.

The aim of the current study was to develop a rural assessment tool that could be completed by an independent observer on a single visit. As such, items were selected from existing tools to ensure ease of direct observation and minimize temporal variability in recorded responses. Tools that had been administered in rural settings were prioritized during the iCHART development process. Fig. 1 outlines the steps taken to develop and test the iCHART tool. The initial draft of the iCHART tool contained 273 items organized into 43 elements that represented important features of rural built environments such as street design, sidewalk quality, and community services. Items were directly adopted or modified from nine existing tools (Table 1) (Yousefian et al., 2010; Caughy et al., 2001; Emery et al., 2003; Brownson et al., 2004; Gauvin

et al., 2005; Day et al., 2006; Clifton et al., 2007; Hoehner et al., 2007; Chow et al., 2010). A codebook was developed to provide detailed descriptions and photos of each item on the tool. Formatting and structure of the iCHART codebook were based on the Rural Active Living Assessment codebook (Yousefian et al., 2010).

**2.1.2. Administration protocol development**

The iCHART tool was designed to be administered in two steps: 1) a 1-mile walking tour and 2) a 3.5-mile windshield tour. A windshield tour is a form of direct observation that involves driving around a given location to enumerate specific characteristics (McGuirt et al., 2011). This observational method allows for identification of community characteristics that are either difficult to observe on foot or not within walking distance. Completing the iCHART using both methods would thus provide a more comprehensive assessment of community characteristics than could be observed by walking alone. A field testing instruction manual was created to provide directions for conducting the walking and windshield tours.

**2.1.3. Pilot testing and revision**

To test and refine the initial iCHART tool, pilot tests were conducted by two research assistants in five rural communities in New York. The research team members were instructed to read through the iCHART tool, codebook, and instruction manual prior to testing. They were also provided with walking and driving routes for each testing location. After each session, they were asked to document any testing difficulties or unclear aspects of the iCHART tool and codebook. Based on this feedback, several items on the initial tool were eliminated (e.g. the choice of “radial” and “grid” community street patterns) and the remaining items were reordered or modified (e.g. “apartments” and “duplexes” were combined into a single item: “rentals”). The revised iCHART consisted of 217 items grouped into 34 elements.

Following pilot testing, the revised iCHART tool and codebook were reviewed by a panel of Extension educators with extensive experience

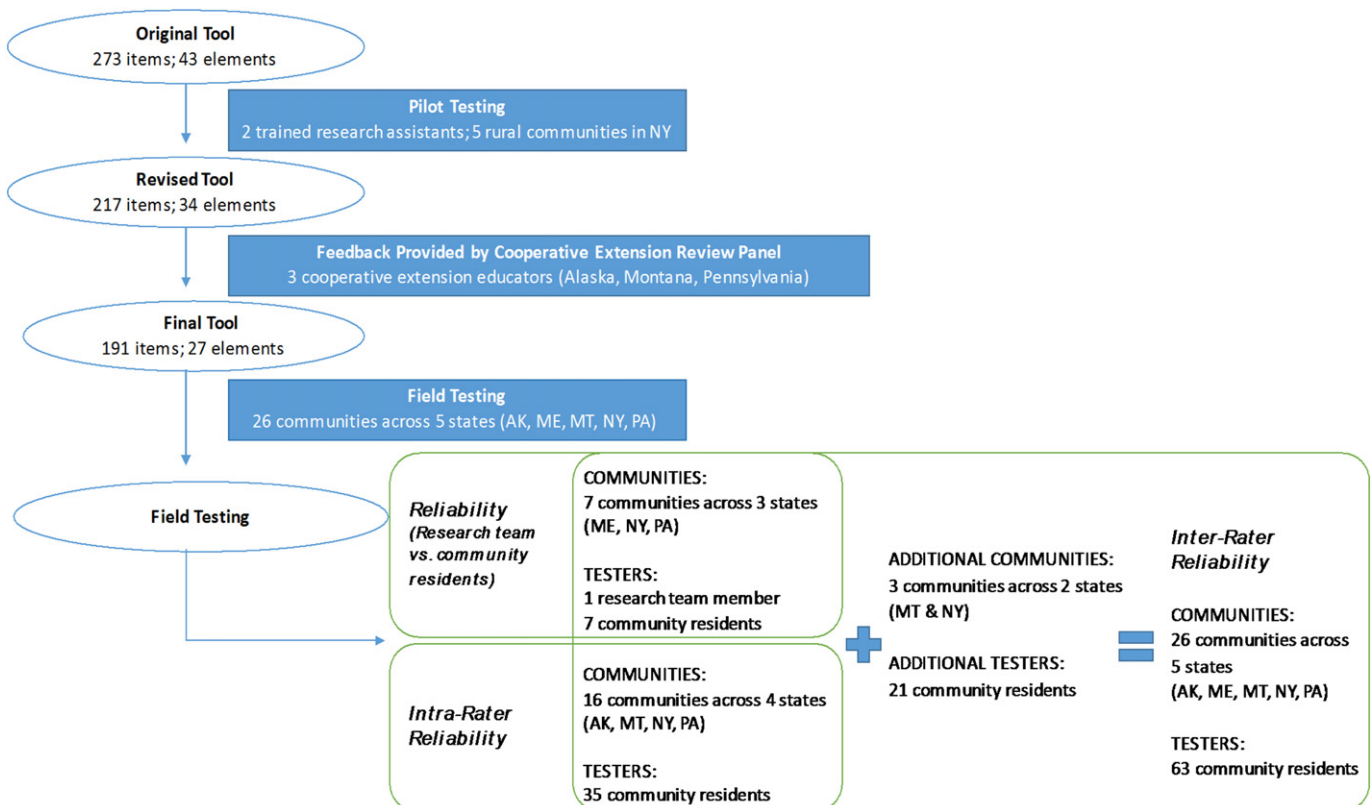


Fig. 1. Steps taken to develop and test the Inventories for Community Health Assessment in Rural Towns (iCHART) tool (July 2013 – November 2014 in the rural United States).

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